

Plan for Today

Complexity of algorithms from Wednesday

Tree traversals

- depth-first traversal
- pre-order, post-order, and in-order

Visitor Design Pattern

- why?
- what?
- traversing trees with a visitor design pattern

SableCC's Visitor Design Pattern

- terminology
- using it

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Visitor Design Pattern

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Example for Tree Traversals



Visitor Design Pattern

Situation

- Want to perform some processing on all items in a data structure
- Will be adding many different ways to process items, different features
- Will not be changing the classes of the data structure itself much

Possibilities

- For each functionality add a method to all of the classes
 - Example of this in PA5, `outputDot`
 - Each new functionality is spread over multiple files
 - Sometimes can't do it
- Use a large if-then-else statement in visit method
 - pro: keeps all the code for the feature in one place
 - con: can be costly and involve lots of casting
- Visitor design patterns

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Visitor Design Pattern

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Borrowed SableCC Visitor Design Pattern

```
BuildSymTable buildSTVisitor = new BuildSymTable(linesToNodes);
ast.apply(buildSTVisitor);
SymTable globalST = buildSTVisitor.getSymTable();

...
// in class VarDecl
public void apply(Switch sw)
{
    ((Analysis) sw).caseVarDecl(this);
}

...
// in class DepthFirstVisitor
public void inVarDecl(VarDecl node) { defaultIn(node); }

public void outVarDecl(VarDecl node) { defaultOut(node); }

public void caseIndExp(VarDecl node) {
    inVarDecl(node);
    if(node.getType() != null) { node.getType().apply(this); }
    if(node.getName() != null) { node.getName().apply(this); }
    outVarDecl(node);
}
```

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FAQ

How do I associate data with a node in the AST if I can't add fields to the node classes?

What if I want to do the same thing on each node?

What if I only need to do something on certain nodes?

Shouldn't the visit/case methods have return values?